

## USEFULNESS OF MLT DURING PROVISIONING AND PRE-PROVISIONING

MLT can be very useful as a test tool for use prior to establishing a customer's service by identifying marginal troubles on the cable pair before the order is completed and customer expectations have been set. MLT provides full diagnostic outputs relative to the loop condition, rather than only a "pass/fail" indication. Some of the results are as follows:

- Test OK, open, foreign voltage, etc.
- AC and DC signatures in Kilo Ohms
- Capacity balance
- Loop length from the Central Office
- Longitudinal Balance

Cable pairs in the outside plant connecting the Central Office to the customer, are subject to many adverse conditions, including weather (rain, snow, excessive heat, lightning), traffic accidents (cars hitting telephone poles), human intervention (engineering related cable rearrangements), induced electrical interference and normal aging. All of these will, or can cause changes to the electrical characteristics of the cable pairs. These changes impact the capability of pairs to provide specific services to varying degrees.

Voice services are more tolerant of marginal cable troubles than data services. In most cases, customers will tolerate a slight "hum" or a bit of intermittent "static" during a conversation on their telephone. With data, these marginal troubles, detectable by MLT, can cause the service to fail. A wet cable often causes a "hum" on the telephone line but subsides once the cable begins to dry. At times, there can be residual moisture, which can take months or years to fully dissipate. While the voice service, while not optimal, may be usable, the cable pair may not be suited for data services until all the moisture is removed.

Damage to a cable by accidents such as cars hitting telephone poles or contractors cutting cables while excavating for construction, will require manual intervention to correct the problem. Often, this work needs to be done quickly to restore service and the technicians may not be able to conduct the same quality checks that would be performed during a planned engineering job. The results can be loose or contaminated connections which can produce the troubles mentioned above, which are tested for by MLT.

Although every precaution is taken for normal cable rearrangements in the outside plant, this is also a potential cause of marginal cable problems. Loose or contaminated connections can cause grounds, opens, foreign voltage, capacitive imbalances or increases in resistance to one, or both conductors of the cable pair used to provide service. Again, these can be detected by MLT testing prior to attempting to deliver service to a customer.

Also, the age of the outside plant cable becomes a significant factor, as the insulation of older cables breaks down over time, making it more susceptible to the previously mentioned factors. As a practical matter, a majority of the copper cable in the outside plant is in the 20 to 40 year old range. Most of this cable has been subjected to many of the harms discussed above, multiple times, each time making the electrical properties of all, or parts of the cable change. For this reason, a representative "sample" of cable pairs in a given point in the network, may not come close to the actual electrical characteristics of the exact cable pair involved in providing the service.